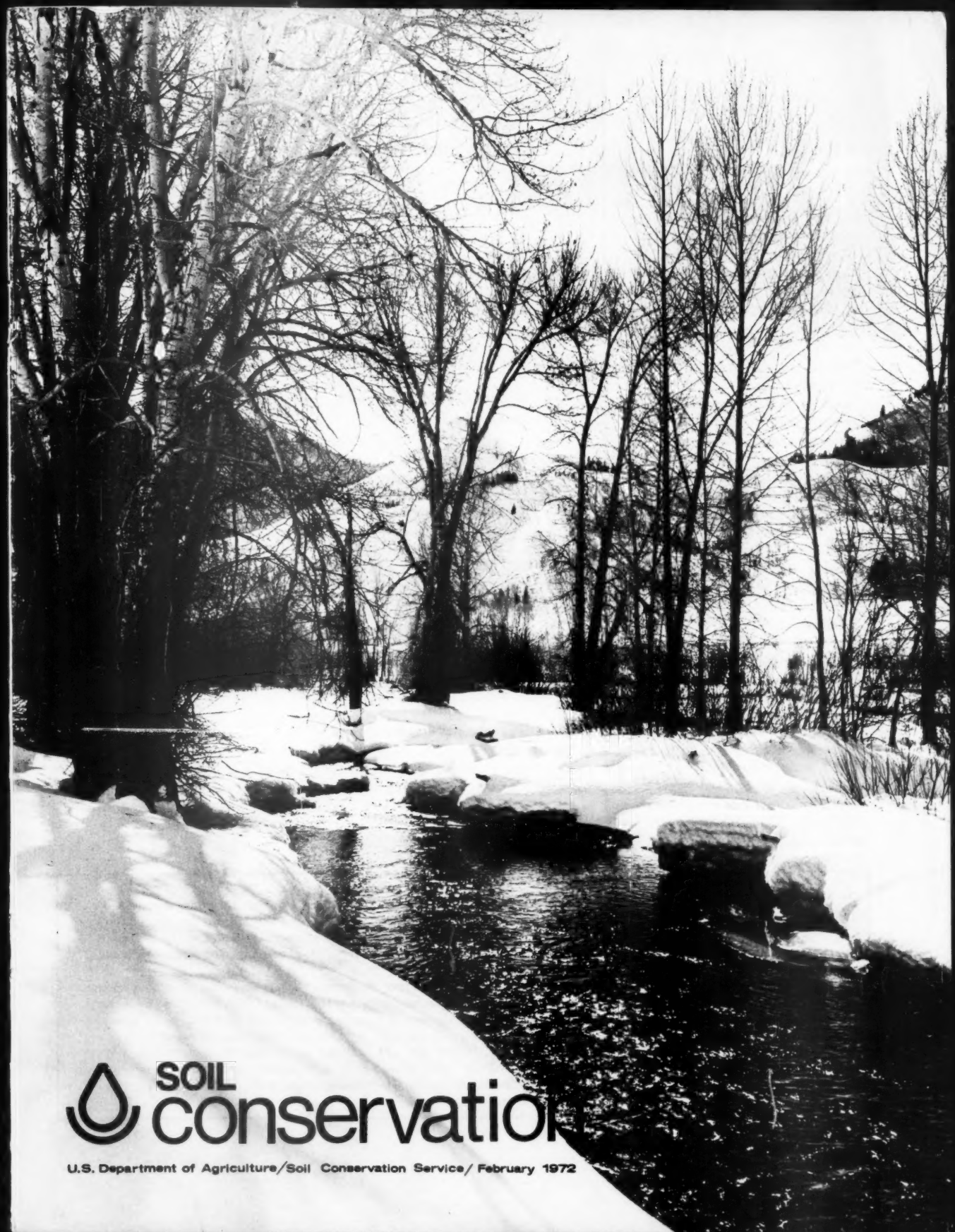

SOIL conservation

U.S. Department of Agriculture/Soil Conservation Service/ February 1972

SOIL conservation

February 1972, Vol. 37, No. 7

The weather may be frightful, but the work of the Soil Conservation Service—like that of your friendly postman—must go on. This month, SOIL CONSERVATION looks at the winter faces of soil and water conservation. SCS's snow survey program continues to grow in importance in the West, and now there's an isotopic snow gage (lead article) that promises to streamline forecasting. The centerspread illustrates how useful snow survey data can be to architects and builders. And several articles point out how the summer efforts of SCS people contribute to our winter fun.

Departing from the winter scene, Don Dudley, assistant director of the Oklahoma Conservation Commission, reports how landowners, by pulling back their fences to widen the right-of-way on rural roads, helped to control sediment pollution.

COVER: This scene along the Little Wood River near Ketchum, Idaho, reflects the serenity and beauty that a winter day can bring. Photo is by Bob Branstead, Washington, D. C.

147 Double-barreled snow gage
by Vincent J. Price

150 Conservation on the ski slopes
by Ford Allen

152 Grass—a friendly base for ski fun
by Ralph H. Felker

154 Mountain maker
by Gerald E. Malone

156 A weight problem
by Donald W. McAndrew

158 Are conservation districts fenced in?
by Don Dudley

159 Willing to serve
by John M. Cross

160 Conservation in action

163 Review

164 Meetings

165 Recon

167 From the Administrator
Understanding our resources

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

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Double-barreled snow gage

by Vincent J. Price
Information Division, SCS
Washington, D.C.

Two-thirds of the surface of the earth is covered by water. Everyone knows that. But how many people know that of the remaining surface one-third is covered by ice and snow? Man now knows a good deal about the ocean: oceanographers, hydrographers, and marine biologists have done much toward explaining the mysteries of the sea. Much less is known about the mysteries of snow.

"Some of the most disastrous floods in the United States have been attributed to too rapid melt of snowpacks or to rain falling on and melting snowpacks," reports Dr. James L. Smith, a hydrologist with the USDA Forest Service. "In California, 51 percent of all streamflow comes from melted snow.

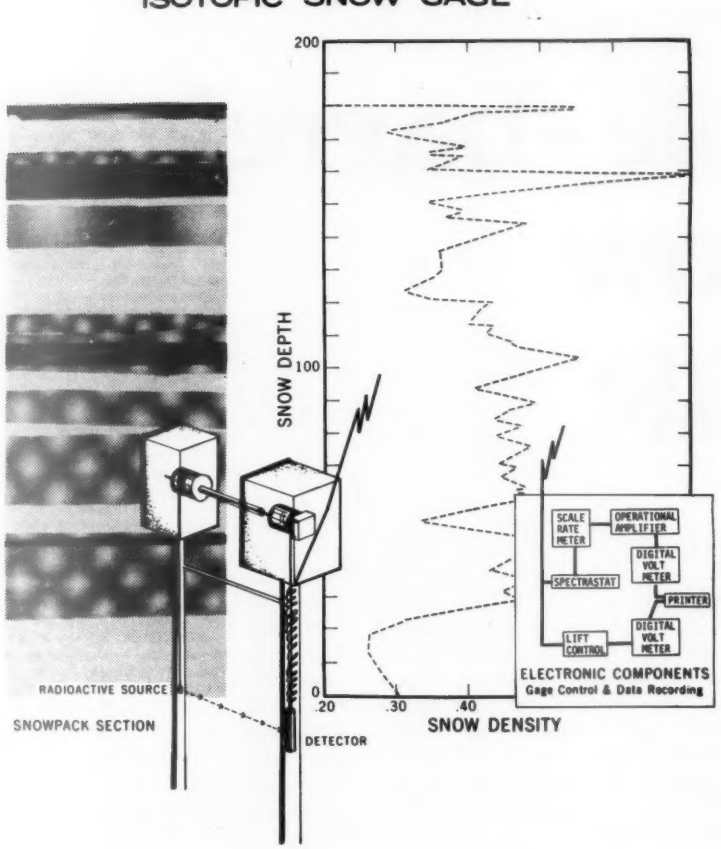
"As man intensifies his activities on the flood plains of rivers, improved warning systems are needed that will permit more time to evacuate people from the flood zone."

Morley Nelson, SCS snow survey supervisor in Idaho (now retired), agrees: "It has been estimated that the total value of water and its management in the Columbia Basin alone is worth more than $1.4 billion per year. The management of this resource varies directly with the quality and timeliness of the data pertaining to it."

For more than 30 years the Soil Conservation Service has provided water forecasts based on snow surveys taken in the mountains. Manes Barton, head of SCS's Water Forecasting Unit at Portland, Oregon, reports that today "the present network, excluding California where snow surveys are conducted by the California Department of Water Resources but including Alaska, consists of 1,450 snow courses, 200 aerial markers, 200 soil moisture installations, and 300 precipitation gages."

But this network and standard snow surveying methods are hardly perfect. For example, Dr. Smith explains that in hand sampling, a hollow tube is driven into the snowpack; it is extracted and the column of snow within the tube is weighed. Knowing the length of the snow sample and its weight, a snow surveyor can compute water content and density with an error of ± 7 to ± 12.

Furthermore, as Manes Barton points out, only the average density of the entire snowpack is obtained by the manual systems. The pack could be "snowball snow" throughout, or it could be hard as a rock on the bottom and only fluff on top. With standard snow surveying techniques, there's no way to tell.



The density of the snowpack between the radioactive source and the detector will print out as shown.

Now, however, there is a way to tell. A new snow gage, based on an isotopic source and a gamma-ray detector, can give a clear picture of the stratigraphy—the strata structure—of snowpacks. Devised by Dr. Smith and installed through a cooperative effort between the Atomic Energy Commission and the Idaho Nuclear Energy Commission, the isotopic snow gage is, as Morley Nelson says, "the only measuring device that gives us the stratigraphy of the snowpack, its depth, and its water content in accurate reproducible form."

Although commonly called the isotopic snow gage, it would be more correct to call Dr. Smith's invention a profiling snow gage. (It could also correctly be called a thermo-electric gamma-attenuation profiling snow gage, but most folks around Sun Valley, Idaho, think that that's a little heavy handed.) Isotopes are already being used to decrease the hazards and difficulty of manual surveying. The Atomic Energy Commission's Oscar M. Bizzell explains that there is "a fly-over system that measures gamma-ray attenuation from a radioisotope source located at ground level under the snowpack. This eliminates the need for ground-level mechanical and electronic equipment in remote and inaccessible sampling sites. Except for the cesium-137 radioisotope on the ground, all the measuring equipment is in a fixed wing aircraft that can quickly fly from one gaging site to another and rapidly measure the snow water at each location."

The Soil Conservation Service in Montana is cooperating in this work and has installed units near Bozeman for study.

The fly-over gage gives information on snow-water content only—it does not tell anything about the condition within the snowpack. And that condition, or stratigraphy, determines how much water runs off, and when.

The AEC, therefore, also funded the profiling snow gage. "The engineering for the snow gage was done by the Aerojet Nuclear Company and was funded by the Division of Isotopes Development of the AEC," explains ANC's Dr. Peter Randolph. Aerojet Nuclear Company is the operating contractor for the National Reactor Testing Station.

The first isotopic-profiling link in the SCS snow survey network is the gage set up on Mt. Baldy in Sun Valley, Idaho. "From the standpoint of mountain snow cover, our Mt. Baldy snow course is a representative area," explains Morley Nelson. "Here within 100 yards there are high winds and many other variables."

A gage has also been set up at Donners Pass in California. That gage is a research instrument reporting to Dr. Smith's office at the University of California at Berkeley. It consists of four parts: the field unit (which does the actual measuring), the base station, a power supply, and a data transmission system (a system to communicate data and commands between the field unit and the base station).

The field unit consists of two access tubes, one containing a radioactive source and the other containing a detector. A lift mechanism, very much like two modified fishing reels, raises and lowers both the ra-

dioactive source and the detector so they are equidistant from each other down the entire length of the access tubes. The detector registers the number of gamma rays reaching it, which depends on how thick the snow is between the source tube and the detector tube. By raising or lowering the source and detector, a profile of the snowpack can be made in increments of ½ to 1 inch.

One of the more interesting engineering problems facing ANC was which isotope to use. "We examined several possibilities for radioactive sources," reports Dr. Randolph. "We concluded that 10 millicurries of cesium-137, as used by Dr. Smith, was just about optimum. This source has a single gamma ray of 662 kilovolts, a 30-year lifetime, and is rather inexpensive."

The base station has almost as many functions to perform as the field unit. It must receive and process data; it must transmit commands; and it should have the capability of running several stations rather than just one. The Mt. Baldy gage has two base stations: the printout is prepared both by the ANC at Idaho Falls and by the SCS snow survey supervisor's office in Boise.

"The most difficult aspect of the design was the data transmission system," reports Dr. Randolph. "The basic requirements for such a system are that it function reliably with minimal maintenance and that it preserve the information that is sent over it without introducing any spurious effects. The usual systems involve radio transmission (telemetry), or some kind of telephone linkage, or a combination of both. Our difficulty was that the snow gage operates so slowly that it would be inefficient to telemeter data across a radio network as the gage took its readings. ANC had to design a device that would prepare the data for transmission to the base station. This year they are using a leased telephone line with data phone, computer, and teletype for transmitting data."

Future installations will utilize telemetry for transmitting data. There are several radiotelemetry networks already, and most isotopic snow gages should be near enough to "hook up" with one.

The easiest aspect of the design was the power supply. Commercial power is usually not available on the remote mountain courses where a snow gage would likely be located. There is some debate as to which of two substitute charging devices is better: a thermo-electric generator or solar panels. But on Mt. Baldy, the snow gage is simply plugged into the nearest electrical socket—that being the Sun Valley ski lift.

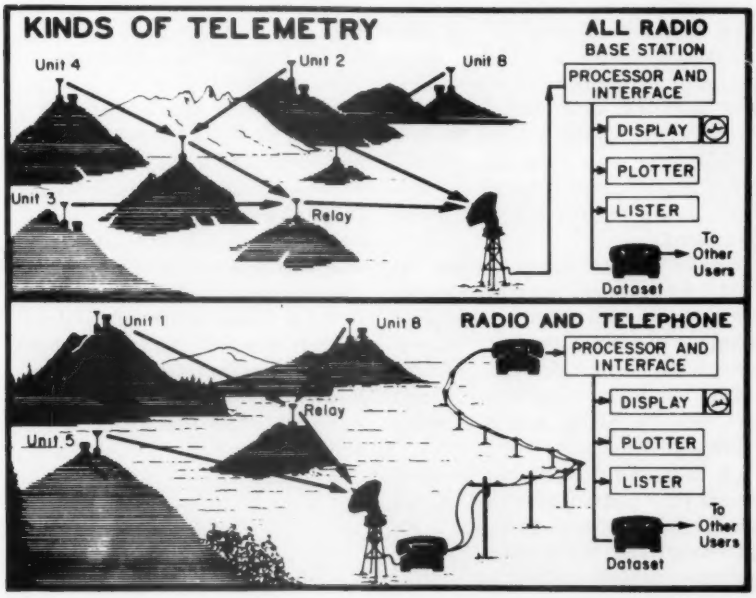
The agencies involved hoped that the Mt. Baldy snow gage would be ready for the winter of 1971-72, and they made it. The first profile was taken on November 24, and the gage has been reporting on command since then.

The gage holds promise to anyone concerned with water resources. Jack Wilson, the current SCS snow survey supervisor in Idaho, suggests that these data are useful in forecasting water runoff for irrigation, power, flood control, pollution control, recreation, industry, and fish and wildlife and in forecasting avalanche hazard.

Winter recreation has benefited from in-depth reports on the condition of the pack; these reports aid Sun Valley skiers and snowmobilers alike.

"The use of data from the profiling snow gage opens a new dimension to streamflow forecasting," says Dr. Smith. "More accurate streamflow predictions from snowmelt could result in better scheduling of reservoir operations and in less 'reservoir spillage.' In some flood situations, such prior knowledge could conceivably save lives."

Perhaps the most eloquent expression of appreciation came from Morley Nelson, who summed up that first November 24 printout with, "Beautiful, magnificent piece of data!" ♦



In the future, snow data will be telemetered via radio or a combination of radio and telephone.

Conservation on the ski slopes

by Ford Allen
District conservationist, SCS
Gaylord, Michigan

Conservation is what everyone talks about these days. Hidden Valley does something about it.

Hidden Valley is a membership club in Michigan's north country. It was founded in the mid-1930's by Don McLouth, a conscientious conservationist who wanted a place where he and his friends could come and enjoy the beauty of the undisturbed north country. Until the late 1940's, the only structure on the site was a warming hut, east of Gaylord, where the present club house is located.

Major construction began in 1947. Lodges and sleeping quarters were built, and later a complete summer recreation program was established. It included golf, swimming, tennis, hunting, boating, and nature trails. Skiing and ski touring were added recently.

In making the ski slopes, the club found they had unknowingly caused an erosion problem. Until then, little erosion had taken place. The ski slopes had been cleared of vegeta-

(Above) A 2,000-foot ski slope covered with creeping red fescue, Kentucky-31 fescue, domestic rye grass, and timothy. Sediment from ski slopes near Gaylord, Michigan, had been choking the headwaters of the Sturgeon River before conservation measures were applied.
(Right, top) The grounds around the two desilting basins built at Hidden Valley to stop the flow of sediment into the Sturgeon River.
(Right, bottom) One of the desilting basins built on streams that originate on the Hidden Valley property. Note the silt fan at the entrance to the basin (in the background) and the clearness of the water (in the foreground) flowing over the gravel bottom as it leaves the basin for the Sturgeon River.

tion during the summer, and after a winter of skiing, the spring rains came and severely eroded the slopes. The sediment that washed down choked the headwaters of the Sturgeon River.

The club went to the Otsego County Soil Conservation. District and the Soil Conservation Service for help. A resource plan was prepared; it included several conservation practices to control soil erosion and sediment and, at the same time, promote esthetics.

The slope that was causing most of the sediment problem is 2,000 feet long and has 280 feet of fall. There are several springs on the slope.

The first step was to design and install a water-disposal system. Then the slope was graded and smoothed for skiing. After that, a seedbed was prepared and fertilizer was applied. Creeping red fescue, Kentucky-31 fescue, timothy, and domestic ryegrass were seeded, and a hay mulch was applied.

The resource plan called for the installation of two desilting basins for the two streams that drained the ski area. Within 10 days after the ground was broken, the basins were completed, the banks were sodded, and the spoil area was seeded and mulched.

Michael Debelack, the club manager, was very pleased with the way the desilting basins removed sediment from the streams during and after rainstorms. Says he, "The basins do an excellent job of trapping the sediment."

Debelack and his foreman, Neil Smith, did not stop with the basins. They went ahead seeding, fertilizing, and mulching eroded areas, roadsides, ditches, and ditchbanks. Where the ditches were too steep to seed, they lined the ditch bottoms with cobblestones.

The membership of Hidden Valley, like everyone else in Otsego County, is concerned about preserving the beauty of Michigan's north country. And they are doing something about it. ♦

Grass — a friendly base for ski fun

by Ralph H. Felker
Area conservationist, SCS
Provo, Utah

Skiers on the slopes at Utah's Park City Resort, east of Salt Lake City, know little of the preparation and work that went into getting the course into its present splendid condition.

They glide and swoop over the heavy white mantle of snow made more firm and lasting by the insulating effect of the thick grass cover underneath.

A. W. (Woody) Anderson, manager of the resort, says that a snow course is in some ways like a house. "It must have a good foundation," he explains. An avowed conservationist, Anderson is aware of the need for plant cover for protection of the land in most of its uses.

Park City has nearly 35 miles of skiing slopes between the 7,000- and 9,400-foot elevations. Seven lifts accommodate skiers at the rate of 7,000 an hour.

The planning of Park City began in 1962. Professional ski-run designers helped with the overall layout.

For help in developing a long-range plan for the entire 12,000 acres of range and forest land, Anderson went to the Kamas Valley Soil Conservation District. He explained to the district supervisors that he had in mind sheep grazing, improved wildlife management, watershed conservation, and an 18-hole golf course in addition to the ski enterprise.

SCS people assigned to the district were ready to help with the conservation work. DeWitt Grandy, a range conservationist, proposed trial field plantings of six varieties of grass. Seed for four varieties—Tegmar intermediate wheatgrass, Pomar orchardgrass, Durar hard fescue, and Sodar wheatgrass—was provided by the SCS Plant Materials Center at Aberdeen, Idaho, because it was not available at the time from commercial sources. Smooth brome and the intermediate wheatgrass seemed to fit the need best.

In 1963 clearing began.

"That was when I got scared," Anderson admitted. "I could see a heavy rainstorm turning the runs into rough, rugged gullies."

By the time the course was ready for use, the grass was doing its job.

In mid-August each year the grass and aspen sprouts are clipped about 8 inches from the ground. The clippings are left on the ground, thus helping to reduce soil loss and to improve water percolation into the soil. They also add to the insulating effect.

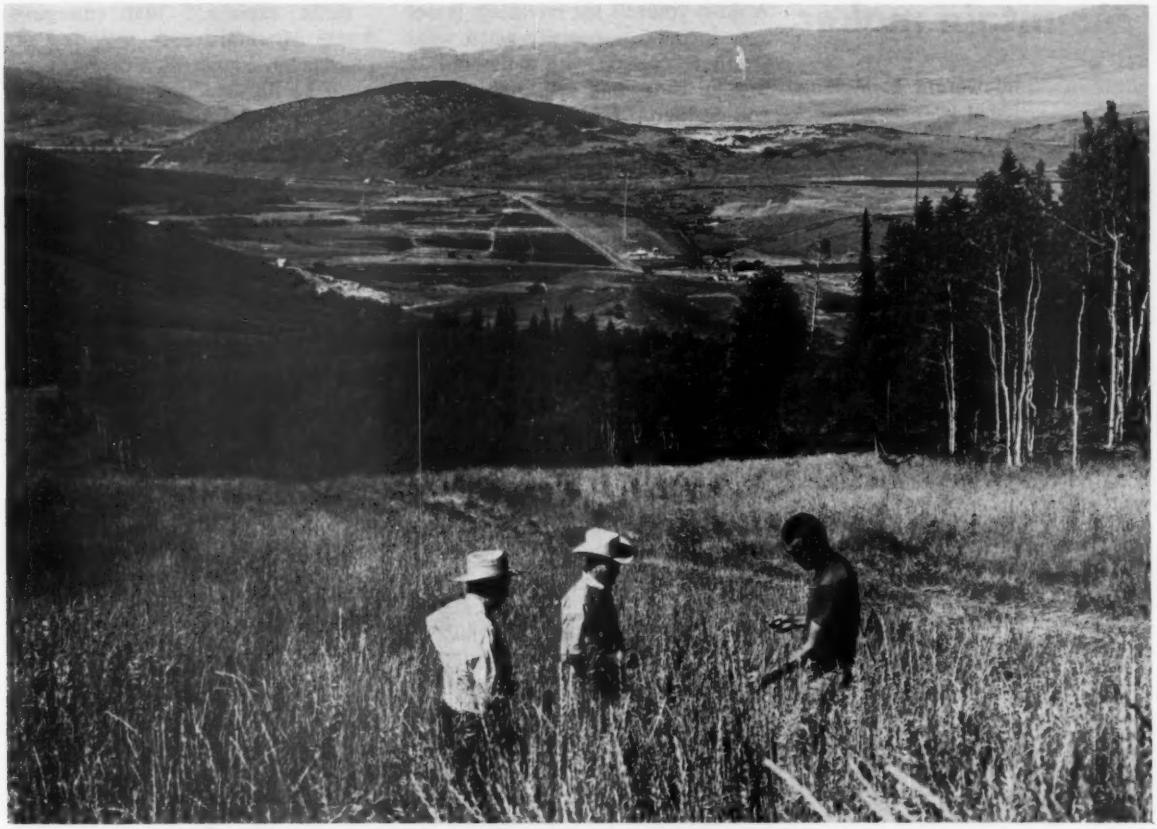
"Where the clippings have accumulated, we have an earlier snowpack and earlier skiing," Anderson explained.

Fire is a continuing threat, especially in August and early in September. The Utah Department of Forestry has worked with Park City Resort on a fire control plan.

The skiing season lasts about 150 days, from mid-November to late April. But there is activity before and after. Deer habitat has improved; visitors riding the gondola lift frequently see deer on the slopes below. Sheep graze certain areas in summer. The entire watershed is protected by improving the vegetation, which keeps water pollution by sediment at a minimum. The 18-hole golf course will be playable next summer.

In winter Anderson and his staff keep a watchful eye on the places where accidents occur. These locations are studied, and the terrain is changed sometimes to reduce the hazard. Disturbed areas are seeded promptly to prevent erosion and to provide the grass base for snow.

There is still work to be done to make the course more efficient, claims Anderson. One objective is to install an electronic snow measuring device to get prompt and accurate information on snow conditions. The Kamas Valley Soil Conservation District is helping with this. The U.S. Weather Bureau has installed a station on the upper part of the complex. With the measuring device to report snow conditions on a moment's notice and the Weather Bureau station to provide forecast information, the Park City



(Above) The tall, thick-growing grass on this ski slope at Utah's Park City Resort was clipped to an 8-inch height before the skiing season began. (Left) Slopes are readied in August and September. The mowed grass and clipped shrubs are left on the ground. They make an ideal base for the coming snows. (Opposite page) Woody Anderson, manager of the Park City Resort, inspects the grass cover on one of the slopes.

staff will be able to keep skiers fully informed.

About 21 percent of the winter days in the area are overcast and snowy, but 55 percent are sunny with day temperatures averaging 20 to 30 degrees. With plenty of snow on the slopes, skiers couldn't ask for anything more. ♦

Mountain maker

by **Gerald E. Malone**
District conservationist, SCS
Saginaw, Michigan

A do-it-yourself ski mountain is not easy to build, especially when what you have to start with is flatland.

John Bintz had a 200-acre fruit- and cash-crop farm near the tri-city area of Saginaw, Bay City, and Midland, Michigan, but he was determined to build a ski mountain.

Bintz' mountain making started late in 1960 shortly after he bought a tractor. By the time he had mastered its operation and the technique of moving earth, the mountain was on its way up. But winter set in and the ground froze, so Bintz had to wait for spring.

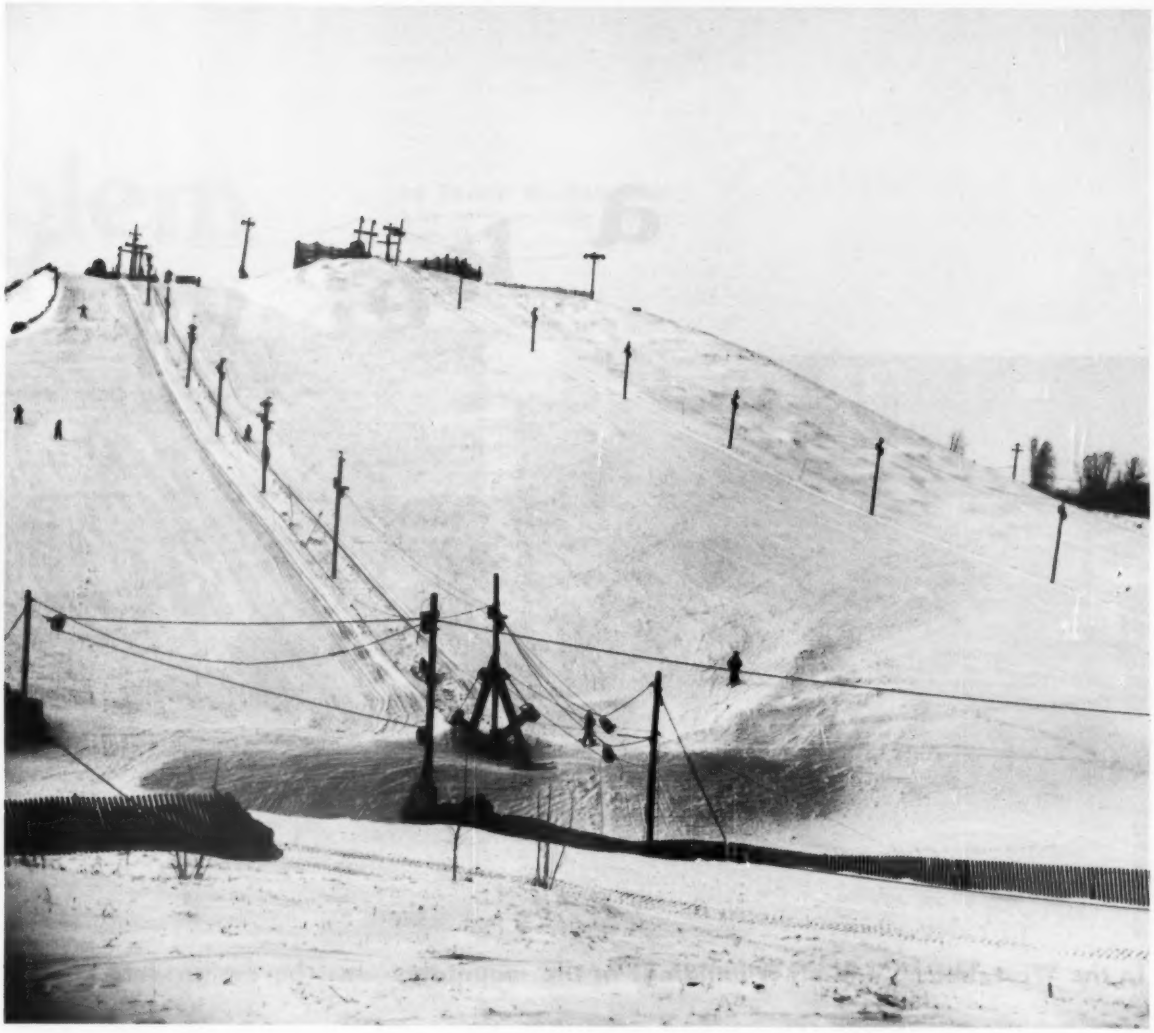
When spring arrived the ground thawed and the rains began. Man and machine were spending as much time getting out of the mud as they were building. But Bintz didn't give up. By the end of summer he had a 30-foot hill. For the next 3 years, his equipment operated almost continuously building the hill to its present 160-foot height. Bintz claims that his mountain, which he calls Apple Mountain, is the highest manmade mountain in the United States.

Bintz explained that enlarging Apple Mountain over a period of years created an erosion problem, so when he finished the mountain, he began a program of seeding. As a longtime cooperator of the Saginaw Soil Conservation District, he requested their assistance.

There is a depression at the bottom of the hill that serves as a sediment basin. Consequently, there was no damage to surrounding land or buildings from the erosion.

The front of the hill was seeded, mulched, and fertilized in the spring of 1971. Bintz buys 1,000 or more trees every year from the conservation district and has established a windbreak of white pine and spruce adjoining the hill. Trees are planted annually to control erosion and to beautify the area. The trees are doing well, but it takes a long time to grow an effective windbreak, so Bintz is now planting larger trees hoping to reduce this time.

The ski mountain, thought of as a way to utilize local labor the year round, is in an area that has virtually no natural slopes for winter recrea-



tion. Bintz has equipped Apple Mountain with eight rope tows, snow making machinery, and a large lodge. In addition to the skiing operation, he has a steak house, ski shop, cider mill, and gift shop—and he still has his apple orchard and cash-crop farm. Bintz employs more than 150 people. About 450,000 people are within 30 minutes driving distance from Apple Mountain.

Making mountains can be fun—and profitable. Already Bintz has a second one under construction. ♦

(Above) A manmade mountain used for skiing. The depression at the foot of the mountain serves as a sediment-catching basin. (Left) John Bintz, extreme right, talks to a group of Michigan State University students before showing them the Apple Mountain complex. Many college students and several thousand school-children tour the Bintz operation every year.

a weight pro

In the West, houses and other buildings in the mountains must be designed to support the we

In the West, as man chooses to live farther and farther into the mountains, the need for snowpack information becomes imperative. Planners, architects, and builders need to know the weight of the snow expected on a roof.

A year ago the Tahoe Regional Planning Agency asked the Soil Conservation Service for this kind of information about the snowpack in the Lake Tahoe Basin.

It was on the slopes of Mount Rose overlooking Lake Tahoe that Dr. James E. Church, a professor at the University of Nevada and an enthusiast for winter mountaineering, began his study of the mountain snowpack in 1904. He developed snow measuring equipment and established permanent snow sampling sites. That was the beginning of the modern science of snow surveying.

By 1909 the value of this new science for streamflow forecasting and water management was recognized. Regularly scheduled surveys started. Today, surveys are carried on throughout the Western States by the Soil Conservation Service and its cooperators.

Yearly snowfall within the Lake Tahoe Basin varies greatly because of elevation and other factors. The snowpack in one of the highly developed areas varies from 16 to 220 inches.

Information from the original snow courses on Mount Rose was among that analyzed to help with snow problems in the basin. SCS snow surveyors marked off eight zones on a map. Snow loads in the zones ranged from 140 to 420 pounds per square foot.

With this information, designers now can provide safety features so that structures will not fail under the heavy loads that build up in winter in the Sierra Nevada. This

roblem

by Donald W. McAndrew
Snow survey supervisor, SCS
Reno, Nevada

e weight of the winter snow accumulation.

—this summer cabin was not.

information is also important to recreation planners and to the operators of ski courses in the Tahoe area.

These and other uses of snowpack information—managing and planning water resources for irrigation, power, and municipal use and warning of possible floods—have developed over the years from Dr. Church's original studies on the snow-mantled peak in Nevada. ♦

The Lake Tahoe Basin covered with the winter's snowpack. Depth of snow typically ranges from 16 to more than 200 inches.

Are conservation districts fenced in?

by Don Dudley
Assistant director
Oklahoma Conservation Commission
Oklahoma City, Oklahoma

"Insufficient rural road right-of-way makes it difficult to shape roadside ditches and to sod a protective grass cover," reports W. A. Juedeman, chairman of the Oklahoma Conservation Commission. "As a result unsightly, dangerous gullies are formed, and these carry sediment to our lakes and streams."

Oklahoma conservation districts have begun to do something about this roadside problem. A prime example of present efforts is the work being done through the Coal County Conservation District Rural Road Improvement Pilot Project.

This project—a cooperative effort between the district, its landowner-cooperators, and county commissioner Sam Nelson of the third district—carries conservation work beyond the fences, so to speak, to the roadside to control roadway sediment pollution. The landowners have moved their fences back, widening the right-of-way and allowing sufficient room for the commissioner to prepare the roadbed and shape drainage ditches.

"Rural road rights-of-way usually are not wide enough to properly construct roads," says Nelson. "A minimum of 70 feet is needed for the roadbed, shoulders, and drainage ditches. If you don't have sufficient space, runoff will cause washing problems, and very little is gained by surfacing the road. But if landowners move their fences back to provide an adequate right-of-way, the roadbed, shoulders, and drainage ditch can be properly designed, and the road surfaced to give years of good use."

Properly designed surfaced roads are safer and cost less to maintain then unpaved roads; they help control sediment pollution, reduce expensive wear on vehicles, add to the beauty of the cou. tryside, increase land values, and help provide a better environment.

Robert Brashears, chairman of the Coal County Conservation District, says that a 2-mile strip of road near Pleasant Hill was selected to get the project underway. Landowners on each side of the road moved their fences back about 10 feet. The Soil Conservation Service gave technical help in designing the drainage area and in establishing a protective grass cover. And the county commissioners had the road designed and surfaced.

Norbie Romines, Ed Harmon, and Jack Kieffer, three landowners living along the road, say that the new road is well worth a few feet of land given up for right-of-way. They and their neighbors are out of the dust and mud, and the appearance of the area has greatly improved.

There are more than 86,025 miles of unsurfaced roads in Oklahoma; this amounts to approximately 518,-724 acres of unprotected sediment-polluting land. Unsurfaced roads are not protected from the forces of wind and water and therefore are subject to critical erosion. In some areas of Oklahoma it is estimated that as much as 100 tons of soil are lost per mile of road.

Conservation districts in Oklahoma are charged by state law as the local unit of government responsible for conserving natural resources. One of the biggest problems is erosion, which comes in many forms. And one of the major sources of sediment pollution is erosion on unsurfaced roads and roadside ditches.

County commissioners report that county funds are inadequate for surfacing rural roads and that federal projects set matching fund requirements too high. It is hoped that by reducing these requirements adequate roads can be built to service rural areas. ♦

Willing to serve

by John M. Cross
Information specialist, SCS
Lincoln, Nebraska

When David Landis graduated from law school last December, the Lancaster County Soil and Water Conservation District in Nebraska immediately had its own built-in lawyer. Landis, who is 23 years old, was elected to the district board while still a law student. He was interested and wanted to serve.

His interest in conservation came from a research paper he did as a college freshmen for a political science class. The paper, "Trans-Basin Diversion of Water," took him into state statutes, led him to the Nebraska Soil and Water Conservation Commission, and finally to local soil conservation districts. After studying the qualifications for district supervisors, the ways to get elected, and how to win, he decided to run for office, and he won. At 22, he was the youngest elected public servant in the state.

To enter the race for district supervisor in Nebraska a candidate must have 10 names on a petition. Landis got eight quickly—his law professors. But his father, Frank Landis, also an attorney and an insurance corporation executive, was opposed to his entry. The senior Landis wasn't sure his "boy" was ready to enter "politics." Eventually, however, he went along with the law professors and signed the petition. Later he laid claim to getting his son elected.

Supervisor David Landis brings to the Lancaster Soil and Water Conservation District Board a freshness of youth combined with wisdom far beyond his years, according to other members of the board who had had some discouraging experiences with young supervisors in the past. Landis has put together an interest in ecology, a knowledge of the law, and a willingness to work.

"We were wondering what we had here," said Owen Perry, chairman of the board. "What we have in Dave is a man willing to listen and learn, and one who gives careful thought to every issue. We older fellows recognize the gap between generations, but Dave fills that gap for us. We see him as a link with the university and young people, one who will let them know what districts have been trying to do for the past 30 years." Perry has served on the board for 21 years; Harvey Ehlers, 20 years; Fred Retzlaff, 4 years; and Bernard Sullivan, 6 years. All are past 40 years of age.

"So many of my generation want leadership positions without working for them," admits young Landis. "I consider my job a way of serving the public—doing the things my generation should do—and I am willing to work for the opportunity.

"Law is a tool for public service as well as for personal gain," says the young lawyer. "I've committed myself to the study of law and thereby have committed myself to serving the public."

Landis wants to continue to live in Lancaster County and continue to serve the soil conservation district. ♦

David Landis, on the left, at 23 is the youngest member of the Lancaster County Soil and Water Conservation District Board of Supervisors. He is shown here with Val Bohaty, SCS district conservationist, in the center, and Owen Perry, district board chairman, on the right.

conservation in action

Instant answers

When do you solve today's problems? Today? Tomorrow? Next week? In a year? Efficiency in solving problems is not equated with fast action alone. Efficiency means doing the *right* thing fast, and usually that takes some doing.

That's what computers are all about—speed *and* accuracy.

These qualities—the computer's virtues—are especially important in conservation. The conservationist has to balance a variety of considerations and come to the best possible alternative; if he deliberates too long, the object of his deliberation may wind up headed down the river or blowing in the wind.

With a properly designed computer system, a resource conservationist or RC&D project coordinator can have at his fingertips much of the information he needs to help him make the right decision fast.

SCS has implemented such a system, a data retrieval system that can accelerate the SCS program and open new dimensions in the manipulation and refinement of data.

The principles behind the Map Information Assembly and Display System are not new. The data to be stored are first represented in some form on a map or grid and then stored symbolically in the computer in such a way that the position of the data on the map is maintained. Once the appropriate "maps" are stored, numerous combinations can be made to satisfy the needs of the user. For example, from river basin maps showing county boundaries, ownership, land use, and soil type, a user could request a new map showing location and area of privately owned land in "X" county that had a severe flood hazard.

The number of combinations that can be made to meet a need is limited only by the amount of data available as base maps. Although computer processing costs are modest, considerable amounts of personnel time are required to tabulate the data for entry into the computer.

Presently, a system is being developed to solve this problem of data entry—the Advanced Mapping System (AMS). Initially designed to automate the preparation of soils maps for published soil surveys, the system will include high-speed scanning devices that will digitize data from aerial photographs or maps and store the data on magnetic tape. When the system is fully implemented, any kind of data can be taken off the maps and processed for combinations and interpretations. AMS not only will solve the time-consuming task of tabulating the data, but also it will store the data in much greater detail than would be practical with manual tabulation. This increased detail will make more refined analyses possible.

These data files developed as part of the Advanced Mapping System will be a part of the system of integrated data bases used to support the Service's Management Information System (MIS). An integrated data base is a data file structured so that information used in common by various users can be stored and retrieved for evaluation, processing, and display. Plant scientists can make direct use of stored soils data, soil scientists can use river basins data, and so on.

Although the overall design of the MIS has not been started, work is underway on some of the data bases that have been identified as being part of the system. These include cartographic soil data, soil classification, and pedon data in the soil data system; site-index data in the woodland data system; plant name data in the range data system; and the Conservation Needs Inventory.

Most of the data bases being developed will store various types of natural resource data; their principal use will be in support of the operational activities of the Service. SCS scientists, coordinators, and conservationists, as well as other planners and decision-makers working with SCS, will have access to a computer data base that provides the information they need when they need it. Further, they will be able to utilize sophisticated modeling and simulation techniques to test the effects of a decision in advance.

But then, that's what computers are all about—speed *and* accuracy, and a way to solve tomorrow's problems today.—ROBERT E. MACLAY, *Management Division, SCS, Washington, D.C.* ♦

SCS helps the short and the tall

There's a "gentle giant" in Jackson Hole, Wyoming. That's what skiers in this area call Rendezvous Peak, the highest ski mountain in North America.

Skiers and sightseers get to the top of the giant, 10,446 feet above sea level, by means of a 63-passen-

ger aerial tram that rises 4,135 feet from Teton Village on the valley floor.

In April 1969, the Jackson Hole Ski Corporation, through the local conservation district, asked the SCS office in Jackson for technical assistance in reseeding several new ski runs on the mountain. That fall, after the runs were cleared, a mixture of hard fescue and dwarf intermediate wheatgrass was seeded and has since proved to be well adapted to the steep, rocky sites.

Sometimes, even a giant needs a helping hand.—DOUGLAS E. PAYNTER, *district conservationist, SCS, Jackson, Wyo.* ♦

One town's efforts

The town of Piermont, New Hampshire, population 445, is an excellent example of what a concerned small town with limited financial resources can do to improve its present and future environment.

Located in the beautiful upper Connecticut River Valley, Piermont is primarily a farming community with dairy cattle outnumbering the resident population many times over. The seasonal home boom, however, and the recreation-bent populance from the large urban areas of southern New England are fast changing the people-cow ratio. A recreation complex is planned for one section of town, and second homes are appearing in the mountains and around lakes and ponds.

In 1968, realizing that these new land uses were rapidly moving up the valley to Piermont, the town planning board developed a comprehensive plan with federal, state, local, and private sources providing information and technical help.

To help implement the plan, the town turned to the Grafton County Conservation District and through them has utilized Soil Conservation Service personnel and the North Country Resource Conservation and Development Project's available resources.

The first efforts were directed towards fire protection for the town. A wetlands conservation inventory conducted by SCS identified 13 sites where water could be stored for many purposes including fire protection. The town shared costs with individual landowners in developing these sites. Dry hydrants purchased through the conservation district were also cost-shared and installed at six of the sites.

Next, a land-use ordinance based on soil information was developed and approved by the voters.

Selectmen and the school board have requested help from the North Country RC&D Project in developing an outdoor classroom on 150 acres of town land adjacent to the elementary school.

Many other projects and requests for assistance ranging from information on critical area stabilization to soil and water conservation facts relating to homesite location remind town officials that good conservation is a constant day-to-day concern.

The town has relied heavily on federal and state agencies for technical assistance, but local people including town selectmen, the planning board, fire department, and civic groups have furnished the impetus to plan and implement the measures necessary to guarantee a quality environment for Piermont.—W. MICHAEL DANNEHY, *district conservationist, SCS, Woodsville, N. H.* ♦

Ecology scholars

A nine-session ecology course entitled "Seminar on Natural Resources and Environment" was included in last semester's adult education program at Northeastern Nebraska College in Norfolk. One or two college students enrolled, but primarily the participants were local people long out of school.

Classes covered such topics as "Soil, the Basic Resource;" "Water, Life's Necessity;" and "Grass, Nature's Healer." These were conducted by area Soil Conservation Service employees on their own time.

University of Nebraska Extension Forester Dick Gavit taught the session, "Forests, a Resource or a Product?" And representatives of the Nebraska Game Commission taught "Wildlife Shares Our Land."

"We had a very enthusiastic group," said Professor Tom Carraher, director of community services for the college.

Purpose of the course was to discuss current resource issues and to hear experts in various fields tell what can be done to solve environmental problems. Each speaker was asked to give both pros and cons of resource management and to relate the resource to the nation's political and economic life.

SCS people, through Budd Fountain, the area conservationist at Albion, helped plan the seminar. The original request for help came through Carl Fox, the district con-

servationist at Madison, who served as the liaison between the college and agency representatives.—JOHN M. CROSS, *information specialist, SCS, Lincoln, Nebr.* ♦

Wheelchairs in the woods

The Forest Service, for the past several years, has been building short, self-guiding trails and other recreation facilities adapted to visitors who are blind or otherwise handicapped. One of the first was the Roaring Fork Trail in the White River National Forest in the heart of the Rocky Mountains near the ski resort of Aspen, Colo. Others are the Whispering Pines Nature Trail in the San Bernardino National Forest, northeast of Los Angeles, Calif., and the Catalina Desert Trail, in Sabino Canyon in the Coronado National Forest, 13 miles northeast of Tucson, Arizona.

To assure their availability during the height of the season, two recreation areas are open only to the handicapped and their families. One is the Mammoth Lakes Campground in the Inyo National Forest in the Sierra Mountains of east-central California. Another is the Trout Pond Recreation Area on the Apalachicola National Forest in western Florida. These areas have special features to accommodate persons in wheelchairs. ♦

Bringing water to the Arkansas Valley

The Arkansas Valley of southeastern Colorado is noted for its excellent crop-producing soils. Poor water supply, however, is a menace to the economy of the area.

The U. S. Bureau of Reclamation has a project underway to eliminate many of the water shortage problems. Through the Fryingpan-Arkansas Project, the Bureau plans to transport needed water from the western slope of the Rockies to the semiarid Arkansas Valley.

Efficient water management requires knowledge of how much water melting snow will produce and when it can be expected. To provide this information, the Soil Conservation Service has added three snow courses to the two already in the basin.

Automatic snow sensors are to be installed to make unnecessary the hazardous 14-mile trip into the mountains each month. These sensors, at the snow course sites, will indicate the amount of water in the snowpack, temperature, wind speed, and wind direction. This information can be available at a minute's notice.—JACK N. WASHICHEK, *snow survey supervisor, SCS, Denver, Colo.* ♦

Weeds, insects, and cotton under study in Mississippi

Basic research in weed and insect control and in cotton physiology will be conducted in the recently opened Delta States Agricultural Research Center in Stoneville, Miss. The work will be done in cooperation with agricultural experiment stations in the South.

The Southern Weed Science Laboratory will work especially on persistent weeds of Southern States. The work will include basic research on the fate of herbicides in the environment, weed control in aquatic situations, and biological weed control using insects and plant pathogens.

Study of the use of parasites and predator diseases, resistant plant characteristics, and other biological factors of the environment to control insects will be done in the Bio-environmental Insect Control Research Laboratory.

Increasing fiber and seed yield while reducing production costs will be the objective of the Cotton Physiology Laboratory. ♦

Review

Books

Natural Resource Conservation: An Ecological Approach. By OLIVER S. OWEN. *1971. The Macmillan Company, New York, N. Y. 593 pp., illus. $9.95.*

People are beginning to appreciate the importance and magnitude of conservation in its all-encompassing meaning and want clarification of the many issues and problems they hear and read about daily. This book, a timely textbook covering the broad multidisciplinary fields of natural resource conservation, is therefore a welcome addition to the conservation literature.

Covering such a broad and diverse field as natural resource conservation, as we define it today, in a single medium-sized text has required careful selection of important materials to illustrate basic concepts, problems, and solutions.

The scope and coverage of this book is best illustrated by listing some of the chapter titles: Nature of Soils; Depletion and Restoration of Soils; Water; Rangeland; Forest Resources; Wildlife; The Ecology and Management of Deer; The Ecology and Management of Waterfowl; Freshwater Fisheries; Marine Fisheries; The Pesticide Problem; Air Pollution; The Human Population Problem; Politics, Education, and Survival.

Students being introduced to natural resource conservation as well as the most seasoned professional conservationists can profit and derive knowledge, insight, and background from this book. Its clarity and straightforwardness may accomplish more conservation education and awareness than all the appropriately cited source materials that are supplied at the end of each chapter.

One of the most important recent developments in conservation is that of recognizing the necessity of using basic ecological approaches in analyzing problems and developing solutions. A very adequate presentation of "Ecological Concepts" is included in chapter 2, early in the text where it belongs. This presentation is fortified with well-chosen figures, charts, and photographs.

Chapter 3, Nature of Soils, in my opinion, is disappointing. It really does not update our knowledge of soil science from many previous sources published 10, 15, or even 20 years ago. This reviewer feels it regrettable that we do not have the particular expertise of author Owen in summarizing the recent advances in soil science that have been stimulated largely through the conservation movement during the past 30 years.

Information presented in chapter 4, Depletion and Restoration of Soils, is generally adequate, well presented, and to the point, but there appears to be an important misrepresentation on page 97. The distinction between activities and conservation assistance supplied to land owners, operators, and management planners by the Soil Conservation Service and the locally organized and operated soil conservation districts, established democratically under state laws, is not accurately portrayed.

Most readers give little attention to appendix materials. The two appendixes included in this book are somewhat extraordinary. Appendix A, The Tragedy of the Commons, is a reprint of a paper by Garrett Hardin, appearing in *Science* 162 (Dec. 13, 1968), 1243-48. Its inclusion verbatim testifies to the discrimination and wisdom of author Owen in selecting material for this textbook. Appendix B, Enforcement of the 1899 Refuse Act Through Citizen Action, will help satisfy the many readers who continually ask, "What can I do to help out in this hour of environmental crisis?"

If I were actively engaged in teaching conservation of natural resources, I would certainly use this textbook. Many details intentionally not covered could be supplied from other sources, and the weaknesses and discrepancies could easily be straightened out in class discussions. —PAUL E. LEMMON, *formerly soil-woodland conservationist, SCS, Washington, D. C.*

Audiovisuals

Consider The Soil First. *1972. Soil Conservation Service, U.S. Department of Agriculture. 73 slide set and illustrated narrative guide. $13.50 slide set, $7.50 film strip.* This new color slide series shows how costly misuses of land can be avoided through the use of soil surveys. The presentation will be of interest to land developers, engineers, zoning officials, land-use planners, home-

owners, and educators. The set can be purchased from the Photography Division, Office of Information, U.S. Department of Agriculture, Washington, D.C. 20250. A cassette recording of the narration is available for $3.

New publications

Frost and the Prevention of Frost Damage. By WILLIAM J. ROGERS AND HARRY L. SWIFT. *1971. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. 35 pp., illus. $0.25.* Describes the nature of frost and ways for protection from frost: heat conservation methods, sprinkling, irrigation, air mixing, passive methods, and heat addition. Discusses damaging temperatures to deciduous and citrus fruits.

Land Use Change in the Southern Mississippi Alluvial Valley, 1950-69—an Analysis Based on Remote Sensing. By H. THOMAS FREY AND HENRY W. DILL, JR. *1971. USDA Economic Research Service Agr. Econ. Rpt. 215. 26 pp., illus.* Special small-scale (1:125,000) aerial photographic imagery of the Southern Mississippi Alluvial Valley was compared in 1969 with conventional imagery of the region in 1950 to obtain data on land clearing, land use, and land change. It reveals major shifts in land use, and data collected in 1969 by remote sensing show that cropland has replaced forest areas as the dominant land use.

Selected Weeds of the United States. *1970. USDA Agriculture Hbk. 366. 463 pp., illus. $4 (Superintendent of Doc., U.S. Gov't Printing Office).* Illustrates and describes 224 species of weeds in the United States and their geographic distribution. Contains a glossary.

Diseases of Forest and Shade Trees of the United States. By GEORGE H. HEPTING. *1971. USDA Agriculture Hbk. 386. 658 pp. $4 (Superintendent of Doc., U.S. Gov't Printing Office).* Brings together the information available on the pathology of many tree species indigenous to continental United States, exclusive of Alaska, and includes diseases occurring in adjacent parts of Canada. It also annotates the diseases of many introduced species grown widely for shade and ornament. Literature citations are listed in the back.

Environmental Quality, Second Annual Report, August 1971. *1971. Council on Environmental Quality. 360 pp., illus. $2.* Presents in depth two fundamental aspects of environmental quality—economics and legal developments; reviews the status of and trends in environmental quality and developments, particularly among the states, since last year; and describes some environmental problems in the inner city.

Specialized Grazing Systems, Their Place in Range Management. By THOMAS N. SHIFLET AND HAROLD F. HEADY. *1971. USDA Soil Conservation Service SCS-TP-152. 13 pp., illus.* A review of the published studies on specialized grazing systems in the United States and other countries. Gives results of deferred rotation and rest-rotation grazing.

Agriculture in the Environment. *1971. USDA Economic Research Service ERS-481. 11 pp., illus.* Articles from *The Farm Index*—"Environment: The Agricultural Perspective," "Using the Land," "Environment: Who Pays for What," and "The Legislative Record"—reprinted because "of the urgency and importance of environmental quality to both the researcher and the general public."

Soil surveys

El Paso County, Tex. By HUBERT B. JACO. *1971. 57 pp., illus.; maps 4 inches to the mile (1:15,840).*

Kooskia Area, Idaho. By DELMAR H. WEBB, RICHARD K. PREECE, OSCAR P. MUELLER, AND MERVIN STEVENS. *1971. 95 pp., illus. maps 3.17 inches to the mile (1:20,000).*

Meetings

February

12-16 American Association of School Administrators, Atlantic City, N.J.
13-17 National Association of Conservation Districts, Washington, D.C.
16-18 Land Improvement Contractors of America, Phoenix, Ariz.
28-March 2 National Farmers Union, Houston, Tex.

March

3-9 Associated General Contractors of America, Houston, Tex.
5-8 Association for Supervision and Curriculum Development, Philadelphia, Pa.
5-9 Society of Toxicology, Williamsburg, Va.
8-11 American Camping Association, New York, N.Y.
10-12 National Wildlife Federation, Mexico City, Mexico
12-15 North American Wildlife and Natural Resources Conference, Mexico City, Mexico
12-18 National Wildlife Week
25-27 Western Audubon Conference, National Audubon Society, Asiloman Beach State Park, Calif.
27-29 American Pulpwood Association, Atlanta, Ga.

April

5-7 Symposium on Engineering Geology and Soils Engineering, Moscow, Idaho
7-11 National Science Teachers Association, New York, N.Y.
15-20 American Society of Planning Officials, Detroit, Mich.
23-26 Association of American Geographers, Kansas City, Kans.
23-27 American Road Builders Association, New Orleans, La.
24-26 National Academy of Sciences, Washington, D.C.
30-May 4 Institute of Environmental Sciences, New York, N.Y.

Recon . . .

Heaven knows, soils are important in picking a site for a house—and a church. District conservationist Ron Fletcher of Lowville, New York, reports, "I have provided the Reverend Tom Kingston with soils information for various possible church locations."

Cherries Jubilee. A method of identifying and mapping red tart cherry orchard sites has been developed in northwest Michigan through the cooperative efforts of the Soil Conservation Service, the Extension Service, and the National Weather Service. Using the factors of soil, physiography, and climate, the red tart cherry site inventory pinpoints those areas where optimum land use is for cherry orchards. Northwest Michigan's red tart cherry industry gives that area a strong claim to the title "America's cherryland."

Wasteland's farewell. SCS Plant Materials Center plants to help revegetate Kahoolawe Island have survived their first year despite very low rainfall. Kahoolawe is the small island in Hawaii that the Navy uses as a bombing and shelling target. The plantings are the result of a joint effort by the U.S. Navy, the Forest Service, SCS, and the Hawaii Department of Land and Natural Resources. The latest progress report shows the plantings looking good as they go into the rainy season and their second year.

By the beautiful sea. With the increase in population pressure in coastal areas and growing demands for second homes and beach cottages, it has become a common practice to level sand dunes. The removal of these natural protective structures exposes the beach strand and the inshore lands to the full force of storm tides and hurricane winds. North Carolina has a law that specifically addresses itself to sand dune protection. The statute is a county-enabling act that, among other things, provides for the establishment of a shore protection line. A permit must be obtained before any alteration of the sand dunes seaward of this line is permitted.

Aquods assessed. As part of its effort to equitably evaluate agricultural land, the Florida Auditor General's office is turning to soil science. A comprehensive 2-day course in soils, presented by the SCS soil survey staff, gave state auditors an appreciation for soil survey information as a base for agricultural appraisals and tax assessment.

Help wanted. According to syndicated columnist Sylvia Porter, by 1980 about 1,200,000 workers will be needed in environmental careers —about twice the number for 1970. Details on some newly developing fields are described in two books suggested by Miss Porter—*Opportunity in Environmental Careers* (Odom Fanning, Universal Publishing and Distributing, $5.95) and *Career Opportunities: Ecology, Conservation and Environmental Control* (J. G. Ferguson Publishing Co., Chicago, $6.95).

Life in the soil. According to Agricultural Research Service scientists, a handful of moist fertile soil contains more organisms than there are people on the earth. The most numerous organisms are single-celled bacteria. Some organisms infect plant roots and are harmful. Earthworms are beneficial organisms because they loosen the soil. Termites and ants bring deposits from deep layers to the surface layer.

Is plastic the wave of irrigation's future? Those who think so can point to three major irrigation developments involving plastic: double-wall tubing for drip irrigation of row crops (the slow rate of flow per outlet gives good moisture penetration without runoff); trickle irrigation (plastic pipes and small lateral plastic tubes deliver water directly to the root system); and plastic catchments of rainfall (a plastic sheet on the ground "harvests" rainfall and delivers it to a covered storage basin).

A test for dispersive clays has been used by SCS's Soil Mechanics Laboratory in Lincoln, Nebr., for many years to identify highly erodible soils in semi-arid and arid regions. Now this test is to be used in all parts of the country. The laboratory plans to use the test on practically all samples received in the future. This test likely will become a routine indicator test for dispersion. It is particularly important in identifying potential channel stability.

Topographic maps. Almost all outdoorsmen know that topographic maps are the best maps not only for revealing all secondary roads but also for finding ways around a specific area. Not many realize, however, the ways that topographic maps can help locate promising spots to *catch fish.* For example, on topographic maps whenever contour lines cross a stream, they *always* form a V pointing upstream because the streambed invariably is at a lower elevation than the banks on

each side. Knowing the direction of flow of the stream, the fisherman can plan to move along the stream in the direction that he wants.

Contour lines sometimes touch but *never cross*. The closer the contour lines are to one another, the steeper the slope of the ground. This information helps the fisherman determine quickly the ruggedness of the terrain he must cross over to reach a stream. Also the steepness of the valley walls will indicate the nature of the stream itself.

Widely spaced contour lines combined with a meandering streambed mean a slow moving current. Conversely, closely spaced contour lines on both sides of the stream indicate that the water must be moving at a high velocity to carve such a steep, narrow valley. And fast water generally is good trout holding water. — JOHN BABBS, *"Pennsylvania Angler," December 1971.*

Those liquid pesticides left over from summer should be stored where they won't be damaged by cold weather. "Some of these formulations will separate at temperatures below 40 degrees, so to be safe store these materials in a heated area," says R. P. Mullett, an entomologist and associate professor with the University of Tennessee Agricultural Extension Service.

Mullett recommends that all leftover pesticides be stored in a dry area set aside specifically for storing pesticides and nothing else.

Mullett suggests building a pesticide storage room or cabinet for year-round use. It should be conveniently located, clearly marked on all sides so its contents are easily known, and kept locked at all times.

Grundy County, Iowa, school children are getting to know the soil around them. Currie Waugh, chairman of the Grundy County Soil Conservation District, says that 140 monoliths have been assembled and distributed to every school in the county as well as to the County Extension Director, County Assessor, and other officials. Students made the trays. SCS soil scientists, who just finished mapping the county, provided the core samples and put the monoliths together.

"Glassphalt." Thirty-five Future Farmers of America members from seven Iowa Chapters helped with a glass recycling public demonstration at the state fairground. More than 10 tons of ground glass were used for an experimental "glassphalt" test strip on a fairground roadway. The work included setting up areas for the demonstration, helping to unload vehicles bringing used glass, and shoveling bottles into the glass grinder. Des Moines public school children collected the glass.

CRIS (Current Research Information System), the USDA computerized information system, has access to some 24,000 pieces of research or research projects from six USDA agencies, 53 state agricultural experiment stations, and 25 other cooperating state institutions.

It can provide, among other things, the names of the people and institutions who did (or are doing) research, give a brief description of the project (title, objectives, work plan, and progress), and list important publications in specific research areas.

The Sawfish, an underwater mower, was recently acquired by the Forest Service for fighting lake vegetation. It is an example of how technology, which has contributed to environment pollution in the past, can also be used to improve the environment for the future. The Sawfish looks like a cross between a small landing barge and a water bug. It works like a barber's shears. The end of the 15-foot craft is a mass of cutting blades for slicing out rectangular chunks of water weeds. After the Sawfish cuts the weeds, a rakelike attachment is affixed and the cut vegetation is pushed to shore for disposal. Excessive vegetation can choke a lake, foul fishing lines, and eventually destroy a body of water.

The Los Angeles Planning Commission, in the aftermath of the February 1971 earthquake, has been working with SCS representatives to develop land-use limitation classifications that take into account potential slippage and slide areas. Soil information will be used as one criterion of limitation, with particular focus directed towards soil surveys on steep slopes and known slide areas.

Peddling plant packets. The Little Kanawha Soil Conservation District is again peddling its annual wildlife plant packets. This year the popular packet program provides, for $6.75, the fixin's for 10 white pine, 5 Colorado blue spruce, 5 Canadian hemlock, and a brace each of American hazelnut, silky dogwood, amur honeysuckle, Washington hawthorne, and Chinese chestnut. West Virginia squirrels and songbirds may well be waiting in eager anticipation.

"Will they ever return?" is the issue being raised by Rheingold Breweries, Inc., during a 1-year test of its "anti-litter returnable bottle" in New Hampshire and three Pennsylvania towns (Easton, Allentown, and Bethlehem). The strong antipollution stand of the *Manchester (N.H.) Union-Leader* was one reason company officials chose the Granite State as a test market. Rheingold President Theodore Rosenak said at the campaign kickoff in Manchester last fall: "If the experiment does not bear fruit, the conclusion will be inescapable that, for all of the public clamor about the part played by beer companies in litter, the consumer, at least in the test area, does not practice what he is ready to preach to others."

From the Administrator:

Understanding our resources

Consider the average American. During his lifetime he will use 26 million tons of water, 10,000 pounds of meat, 14 tons of milk and cream, 9,000 pounds of wheat, and great quantities of other products from the earth. In addition, he will build his home on the land, and he may fish in the lakes, hunt in the woods, and walk the prairies, parks, and seashores for health and pleasure.

How's the American land and water doing these days? Soil Conservation Service people are helping to answer that question.

SCS has developed the techniques and expertise to collect data on the condition of soil and water on the two-thirds of our land in private ownership or operation and to evaluate, plan, and design various resource management systems for its better use. But we still have much to learn.

Conservation work of any kind must be based on accurate and timely facts and forecasts. SCS will be even more deeply involved in the work of surveying and monitoring renewable natural resources, and their uses, in the years ahead.

Soil surveys provide the farmer and suburban land planner alike with necessary information. They are an indispensable planning tool. The SCS goal is a soil survey of the Nation that is current and complete.

The snow survey and weather supply forecasting program continues to grow in popularity. As new uses for the data develop, we must be prepared with the best possible methods for securing and analyzing information.

There is a need for better information on the rate, amount, and nature of sediment yields.

There is a need for better basic resource data and for a more complete system of monitoring the conditions of the Nation's natural resources. The current Conservation Needs Inventory supplies some of this information. We must encourage its widespread use.

Effective survey and monitoring work will be greatly helped by new resource technology. The National Aeronautics and Space Administration plans to place the first Earth Resources Technology Satellite (ERTS) into a near-polar orbit in the near future. The satellite will transmit data back to earth on urban and rural land uses, geologic features, observable pollution, and other aspects of the earth's surface. This information should be helpful to many groups.

There remains another vital aspect. When the necessary survey and monitoring information has been gathered by SCS and other agencies, there must be an effective "delivery system." Decision makers and private citizens all across the Nation should know about this information. Our increasing assistance to urban planners, town and county officials, farmers, and other landusers will require, as always, the best professional skills and personal attributes of SCS men and women.

Better resource technology; more complete survey and monitoring information; an effective method of relaying information to its ultimate users—SCS will be active in all of these areas.

In the 1970's, that average American who wants good land and water use and the men and women who make the decisions affecting him will be looking to us for help.

Kenneth E. Grant

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There's no question about what "SCS" stands for on this Oklahoma auto tag because that's Bill Vaught, the Soil Conservation Service's state conservationist in Oklahoma, fastening the tag to his car.